

**OUTBREAKS OF CACTUS FELT SCALE, *ERIOCOCCUS COCCINEUS* COCKERELL AND FELTED PINE COCCID, *ERIOCOCCUS ARAUCARIAE* MASKELL (HEMIPTERA: ERIOCOCCIDAE), ON ORNAMENTAL PLANTS IN BRITAIN**

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ABSTRACT

Outbreaks of two non-indigenous eriococcids, *Eriococcus coccineus* Cockerell and *E. araucariae* Maskell, on ornamental plants at commercial plant nurseries in the UK, are reported. The distribution, biology and economic importance of these plant pests are reviewed.

INTRODUCTION

In December 1997, Les Wardlow (a private consultant) reported finding cacti heavily infested with 'mealybugs' at a nursery in West Sussex. The plants had been imported from the USA in the previous spring, and on arrival had been kept in quarantine for about six weeks. Specimens were collected from *Rebutia* sp. (Cactaceae) and passed to Mike Lole of the Agricultural Development Advisory Service (ADAS) before being sent to the Central Science Laboratory (CSL), where they were identified as *E. coccineus*. Further samples were collected by the Plant Health and Seeds Inspectorate (PHSI). *Eriococcus coccineus* was subsequently found infesting plants of *Echinopsis pentlandii* (W.J. Hooker) Salm-Dyck (Cactaceae) at a nursery in Norfolk in April 1999 by the PHSI. Previous to these findings, it had been intercepted at a botanical garden, Surrey on *Harrisia tortuosa* (J. Forbes ex Otto & A.Dietr.) Britt. & Rose (Cactaceae) imported from the Virgin Islands in June 1985.

In August 2005 three Norfolk Island pines, *Araucaria heterophylla* Franco (Araucariaceae), imported from The Netherlands were found to be heavily infested with *E. araucariae* by the PHSI on 10.x.2005. This species has been previously intercepted also, at a nursery in West Drayton, Middlesex on *Araucaria* sp. imported from Spain in March 1979. In all cases the eriococcids were eradicated following advice from CSL and the PHSI.

*ERIOCOCCUS COCCINEUS* COCKERELL

The taxonomy of *E. coccineus* is complex; it was described by Cockerell (1894) from specimens collected by Professor Bruner in May 1894 from 'rat-tailed' cactus in a greenhouse in Lincoln, Nebraska (USA). Cockerell also described a 'variety' of this species at the same time, under the name *lutescens*. Ferris (1955) dismissed the variety *lutescens* as 'unworthy of serious consideration' and according to Miller & Miller (1992) it 'is only a colour form and should not be considered as a valid subspecific or specific name'. Lindinger (1931) considered *Rhizococcus cactearum* Leonardi a synonym of *E. coccineus* and Zimmermann (1948), Ferris (1955) and Hoy (1962) also thought that it was possibly a synonym. Later workers, however, have recognised these species as distinct (Hoy, 1963; Tranfaglia & Esposito, 1985; Köhler, 1998). Cockerell (1900) and Lindinger (1931) both treated *Eriococcus multispinosus* (Kuhlgtatz) as a synonym of *E. coccineus* but this was not accepted by subsequent

workers (Hoy, 1963; Köhler, 1998). Lindinger (1933) referred the species *coccineus* Maskell to the genus *Nidularia*, Kozár & Walter (1985) to *Acanthococcus* and Tang & Hao (1995) to *Rhizococcus*. More recently, Köhler (1998) and Miller & Miller (1992, 1993) assigned the species to the genus *Acanthococcus*. However, Miller & Gimpel (2000) in their catalogue of the family Eriococcidae, considered *Acanthococcus* to be a synonym of *Eriococcus*.

*Eriococcus coccineus* is commonly known as the 'Cactus Felt scale', 'Woolly Cactus scale' or 'Cactus eriococcin'. Miller & Miller (1992, 1993) provide a detailed morphological description, illustration and keys for its identification.

### Geographical distribution

*Eriococcus coccineus* appears to be native to Mexico and southern parts of the USA (Miller & Miller, 1992). It has been transported on ornamental cacti all over the world and has been recorded in the following regions and countries: Palaearctic: Canary Islands (Spain), Egypt, France, Germany, Israel, Italy and Japan. Afrotropical: South Africa. Nearctic: Mexico, 13 states in USA (mostly southern). Neotropical: Brazil. Oceania: Australia, Hawaii (USA) and New Zealand (Miller & Gimpel, 2000). Hoy (1963) also listed England but this record is doubtful as he provided no details and it was not included in the comprehensive checklist produced by Boratyński & Williams (1964), nor in the detailed work on British Eriococcidae by Williams (1985).

### Host plants and biology

*Eriococcus coccineus* feeds almost exclusively on Cactaceae, being recorded on the following genera: *Acanthocereus*, *Astrophytum*, *Brasilicactus*, *Cephalocereus*, *Cereus*, *Cleistocactus*, *Echinocactus*, *Echinocereus*, *Echinopsis*, *Harrisia*, *Hylocereus*, *Mammillaria*, *Neomammillaria*, *Opuntia*, *Pelecyphora*, *Rebutia*, *Rhipsalis*, *Selenicereus*, *Thelocactus*, *Wilcoxia* and other unspecified Cactaceae (Miller & Gimpel, 2000). There are several unusual records of *E. coccineus* found on plants not in the Cactaceae. For example, in New Zealand, on Orchidaceae imported from California (Hoy, 1962) and on *Ananas* (Bromeliaceae), *Dudleya* (Crassulaceae), *Euphorbia* (Euphorbiaceae), *Haworthia* (Aloaceae) and *Pinus* (Pinaceae) in the western USA (Miller & Miller, 1992, 1993). These may not be true hosts because the mature females typically leave the feeding site before parturition and may have wandered off adjacent cacti onto these plants in order to produce the ovisac. Ovisacs are even occasionally found on plastic plant pots and wooden benching in green houses containing cacti.

*Eriococcus coccineus* has continuous overlapping generations (Gill, 1993).

### Economic importance

*Eriococcus coccineus* is considered to be economically important in the USA (O'Brien, 1991) and is a pest of Cactaceae in Italy (Longo *et al.*, 1994). It feeds on the phloem, which reduces plant vigour by depletion of plant sap and, if left unchecked, can kill ornamental cacti. Feeding by a related species, *Eriococcus coriaceus* Maskell, has been shown to consistently reduce root growth in seedlings of the host plants. Low levels of scale insect infestation significantly decreases root and lignotuber biomass but not shoot biomass. High levels of infestation, however, adversely affect all plant parts (Vranjic & Ash, 1997). The 'cocoon-like' ovisacs produced by

*E. coccineus* can lower the aesthetic appearance of ornamental cacti, thereby reducing their quality and commercial value. The ovisacs are most conspicuous on cacti with long spines.

### *ERIOCOCCUS ARAUCARIAE* MASKELL

*Eriococcus araucariae* was described by Maskell (1879) from specimens collected near Governor's Bay, South Island, New Zealand. Cooke (1881) referred the species *araucariae* Maskell to the genus *Uhleria*, Comstock (1881), Kozár & Walter (1985) and Köhler (1998) referred it to *Rhizococcus*, Lindinger (1933) to *Nidularia*, and Tereznikova (1981) to *Acanthococcus*. However, Miller & Gimpel (2000) synonymized *Acanthococcus* with *Eriococcus*.

*Eriococcus araucariae* has many common names including 'Araucaria Mealybug', 'Araucaria pest', 'Araucaria Scale', 'Felted Pine Coccid' or 'Norfolk Island Pine Scale'. Kosztarab (1996) provides a morphological description, illustration and keys for its identification.

### Geographical distribution

*Eriococcus araucariae* appears to be native to the Neotropics and has been transported on ornamental *Araucaria* all over the world, including to the following regions and countries: Palaearctic: Algeria, Azores (Portugal), Canary Islands (Spain), Egypt, France, Germany, Greece, Iran, Israel, Italy, Madeira Islands (Portugal), Malta, Morocco, Netherlands, Portugal, Russia, Sardinia (Italy), Sicily (Italy), Spain and Turkey. Oriental: India, Malaysia, Philippines and Sri Lanka. Afrotropical: Kenya, Mauritius, South Africa and Zimbabwe. Nearctic: Mexico, nine states in USA. Neotropical: Argentina, Bermuda, Brazil, Chile, Costa Rica, Cuba, Guatemala, Nicaragua, Panama, Puerto Rico & Vieques Island, Uruguay and Venezuela. Oceania: Australia, Cook Islands, Fiji, Hawaiian Islands, New Caledonia, New Zealand, Papua New Guinea and Vanuatu (Miller & Gimpel, 2000).

### Host plants and biology

*Eriococcus araucariae* is most commonly recorded on *Araucaria* (Araucariaceae) but has occasionally been recorded feeding on plants belonging to other genera and families including Cupressaceae: *Cupressus*, *Juniperus*; Myrtaceae: *Kunzea*; Pinaceae: *Pinus*; and Poaceae: *Eleusine*.

Gill (1993) reported that *E. araucariae* has two generations per year in the USA and that the adult males are active in August.

### Economic importance

*Eriococcus araucariae* is considered an economic pest of *Araucaria heterophylla* Franco (= *A. excelsa* R. Br.) in Egypt (Moursi Khadiga *et al.*, 2001). The large amounts of honeydew produced by the insect provide a medium for sooty moulds which often blacken the host foliage (Williams & Watson, 1990); and the 'cocoen-like' ovisacs can lower the aesthetic appearance of ornamental *Araucaria*, thereby reducing their quality and commercial value.

## CONCLUSION

All known outbreaks of *E. coccineus* and *E. auracariae* in the UK have been eradicated under the guidance of the PHSI and CSL but there is a risk of these pests being accidentally introduced with international plant trade. Nine species of exotic Coccoidea that feed on Cactaceae have already become established in Britain under artificial conditions (*Abgrallaspis cyanophylli* (Signoret), *Diaspis echinocacti* Bouché, *Parasaissetia nigra* (Nietner), *Phenacoccus defectus* Ferris, *Rhizococcus cacticans* (Hambleton), *Pseudococcus longispinus* (Targioni Tozzetti), *Pseudococcus viburni* (Signoret), *Spilococcus mammillariae* (Bouché), *Vryburgia brevicurvis* (McKenzie)), and two species that feed on *Araucaria* have also become established (*Chrysomphalus aonidum* (L.) and *Rhizococcus falcifer* Kunckel d'Herculais). There are many other coccoid species, not recorded in Britain, which feed on cacti and *Araucaria*. These plants are popular as ornamental houseplants and care must be taken to avoid the accidental introduction of coccoid pests, since once established, they are often difficult to control.

Any suspected findings of non-indigenous insects on recently imported plants should be passed to the local Defra PHSI or to the PHSI Headquarters, York (Tel.: 01904 455174, email: planthealth.info@defra.gsi.gov.uk).

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## SHORT COMMUNICATIONS

**Small Copper *Lycaena phlaeas* (L.) nectaring on creeping willow.** – Two adult Small copper butterflies were observed repeatedly feeding on catkins of creeping willow *Salix repens* L. at the Long Pits, Dungeness on 17.v.2006. This butterfly is quite common in wind-protected areas there and may be a potential pollinator of this local willow. The two butterflies, however, were rather territorial and kept to their small patch of grassland. The distances they were observed flying during the afternoon (10–15 m) were very much shorter than the average distance between two *S. repens* plants (50 + m). – J. S. BADMIN, Coppice Place, Selling, Kent ME13 9RP.